# Service Manual

NATIONAL
HI-FI COMPONENTS
PANASONIC

4-Band
FM/AM STEREO RECEIVER

MODEL SA-4400

## TECHNICAL SPECIFICATIONS (Specifications are subject to change without notice.)

### AUDIO SECTION

| | | |
|---|---|---|
| **IHF Music Power:** | | 100W (4Ω)<br>66W (8Ω) |
| **RMS Power:** Each ch. | | 35/35W (4Ω)<br>27/27W (8Ω) |
| **Harmonic Distortion:** | | 0.8% |
| **Intermodulation Distortion (60Hz, 7kHz 4:1, SMPTE):** | | 1% |
| **Power Bandwidth:** | | 40Hz~12kHz, −3dB |
| **Frequency Response:** | PHONO | RIAA Standard Curve ±1dB |
| | AUX | 20Hz~35kHz, +0dB, −3dB |
| **Input Sensitivity & Impedance:** | PHONO | 2mV/50kΩ |
| | AUX | 180mV/100kΩ |
| | TAPE MONITOR | 180mV/50kΩ |
| **Residual Hum & Noise:** | | 1.5mV |
| **S/N (IHF, A):** | PHONO | 70dB |
| | AUX | 90dB |
| **Tone Controls:** | BASS | +13dB, −14dB (50Hz) |
| | TREBLE | +10dB, −10dB (10kHz) |
| **Loudness Control:** | | +11dB (50Hz), +4dB (10kHz) |
| **High Filter:** | | 6kHz, −6dB/oct |
| **Low Filter:** | | 150Hz, −6dB/oct. |
| **Damping Factor:** | | 25 (4Ω), 50 (8Ω) |
| **Recording Output Level:** | | 180mV |
| **Load Impedance:** | | 4~16Ω |

### FM TUNER SECTION

| | | |
|---|---|---|
| **Frequency Range:** | | 88~108MHz |
| **Sensitivity (IHF):** | | 2μV |
| **Harmonic Distortion (at 400Hz, 100% Mod.):** | Mono | 0.4% |
| **S/N:** | Mono | 65dB |
| **Alternate Channel Selectivity:** | | 60dB |
| **Image Rejection (at 98MHz):** | Mono | 45dB |
| **AM Suppression:** | | 45dB |
| **Capture Ratio (IHF):** | | 2dB |
| **Stereo Separation (at 1kHz):** | | 35dB |
| **Frequency Response:** | | 100Hz~12kHz, ± 1dB |

### AM TUNER SECTION

| | |
|---|---|
| **Frequency Range & Sensitivity:** | LW : 145~285kHz, 23μV<br>MW : 510~1610kHz, 8μV<br>SW : 5.9 ~18MHz, 40μV |
| **Harmonic Distortion:** | 1% |
| **Selectivity (at 1000kHz ±10kHz):** | 25dB |
| **Image Rejection (at 1000kHz):** | LW : 40dB (250kHz)<br>MW : 40dB (1000kHz)<br>SW : 12dB ( 10MHz) |

### GENERAL

| | |
|---|---|
| **Power Consumption:** | 240W |
| **Power Supply:** | (50/60Hz) 110/120/220/240V |
| **Dimensions (including control knobs and fuse post, W×H×D):** | 16-31/32" ×5-5/32" ×13-19/32" (431×131×345mm) |
| **Weight:** | 20.3lbs. (9.2kg) |

## TECHNISCHE DATEN (Anderungen vorbehalten)

(Erfüllt die Mindestanforderungen nach DIN 45 500)

### VERSTÄRKERTEIL

| | | |
|---|---|---|
| **Musikleistung (bei Aussteurung beider kanäle):** | | 2×50W (4Ω)<br>2×33W (8Ω) |
| **Nennleistung (Sinusleistung, bei Aussteurung beider Kanäle):** | | 2×24W (4Ω)<br>2×20W (8Ω) |
| **Intermodulation (bei 250/8,000Hz 4:1 Nennleistung 4Ω):** | | 0.8% |
| **Leistungbandbreite:** | | 40~12000Hz (−3dB) |
| **Frequenzgang:** | | 20~35000Hz (−3dB) |
| **Dämpfungsfaktor:** | | 25 (4Ω), 50 (8Ω) |
| **Ausgänge Lautsprecher:** | | 4~16Ω |
| **Fremdspannungsabstand:** | bei 50mW Ausgangsleistung | PHONO 53dB<br>AUX 53dB |
| | bei Nennleistung | PHONO 60dB<br>AUX 80dB |
| **Eingänge:** | PHONO | 2mV/50kΩ |
| | AUX | 180mV/100kΩ |
| **Tonband norm-buches (DIN):** | Wiedergabe | 300mV/55kΩ |
| | Aufnahme | 40mV/85kΩ |
| **Tonband cinch-buches:** | Wiedergabe (PLAY BACK) | 180mV/50kΩ |
| | Aufnahme (REC OUT) | 180mV/100Ω |
| **Klangregler:** | Tiefen-Bereich | +13dB, −14dB bei 50Hz |
| | Höhen-Bereich | +10dB, −10dB bei 10kHz |
| **Rumpelfilter:** | | 150Hz bei −6dB/oct |
| **Rauschfilter:** | | 6kHz bei −6dB/oct |

### UKW-TUNERTEIL

| | |
|---|---|
| **Antennenanschluß:** | 300Ω (ausgeglichene) 75Ω (unausgeglichene) |
| **Empfangsbereich:** | 88~108MHz |
| **Empfindlichkeit:** | 2.0μV, 30dB Rauschabstand 300Ω<br>1.5μV, 20dB Rauschabstand 300Ω<br>1.1μV, 20dB Rauschabstand 75Ω |
| **Klirrfaktor:** | Mono 0.4%<br>Stereo 0.7% bei ±40kHz Hub |
| **Fremdspannungsabstand:** | Mono 60dB<br>Stereo 60dB bei ±40kHz Hub |
| **Selektivität bei 400kHz:** | 60dB |
| **ZF-Festigkeit:** | 70dB |
| **Spiegel-Selektion:** | 45dB |
| **AM-Unterdrückung:** | 45dB |
| **Gleichwellen-Selektion:** | 2dB |
| **Pilotton-Unterdrückung:** | 42dB bei 19kHz<br>47dB bei 38kHz |
| **Stereo-Übersprechdämpfung:** | 35dB bei 1kHz<br>20dB bei 10kHz |
| **Bandbreite:** | ZF-Verstärker 400kHz<br>UKW-Demodulator 700kHz |

### AM TUNERTEIL

| | |
|---|---|
| **Empfangsbereich:** | LW : 145~285kHz<br>MW : 520~1610kHz<br>SW : 5.9~18MHz |
| **Empfindlichkeit:** | LW : 23μV, 20dB Rauschabstand<br>MW : 8μV, 20dB Rauschabstand<br>SW : 40μV, 20dB Rauschabstand |
| **Selektivität:** | 25dB |
| **Spiegel-Selektion:** | 40dB |
| **Klirrfaktor:** | 1.5% |
| **Fremdspannungsabstand:** | 40dB |

### ALLGEMEINE DATEN

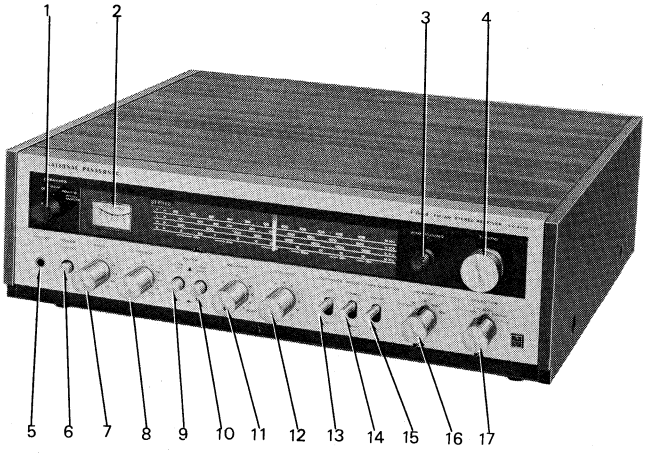
| | |
|---|---|
| **Leistungaufnahme:** | 240W |
| **Netzspannung Umschaltbar:** | 110/120/220/240V |
| **Abmessungen (über alles):** | (B×H×T) 431×131×345mm |
| **Gewicht:** | 9.2kg |

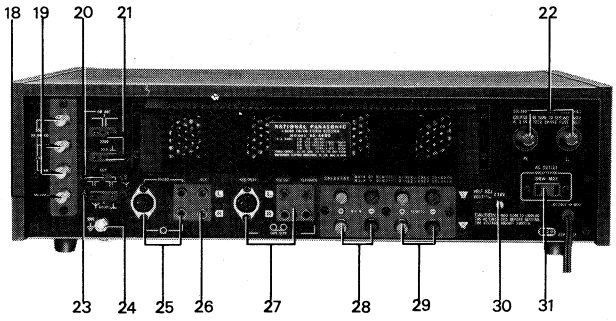

MATSUSHITA ELECTRIC
MATSUSHITA ELECTRIC TRADING CO., LTD.
P. O. Box 288, Central Osaka, Japan

ORDER NO. AD-018

## ■ LOCATION OF CONTROLS

1. SPEAKERS SWITCH
2. TUNING METER
3. FINE TUNING CONTROL
4. TUNING CONTROL
5. HEADPHONES JACK
6. POWER SOURCE SWITCH
7. BASS CONTROL
8. TREBLE CONTROL
9. LOW FILTER SWITCH
10. HIGH FILTER SWITCH
11. BALANCE CONTROL
12. VOLUME CONTROL
13. LOUDNESS SWITCH
14. MODE SWITCH
15. TAPE MONITOR SWITCH
16. AM BAND SELECTOR SWITCH
17. SELECTOR SWITCH



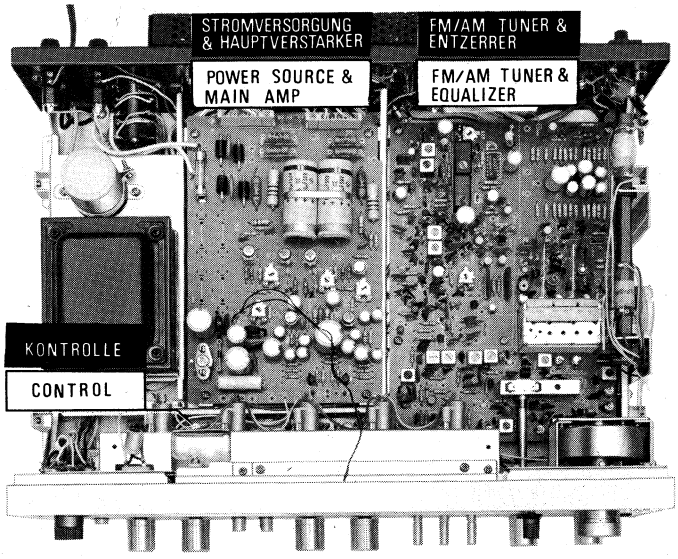

18. AM ANTENNA TERMINAL
19. FM ANTENNA TERMINALS
20. ANTENNA SELECTOR SWITCH
21. FM ANTENNA SOCKET
22. SPEAKERS PROTECTION FUSES
23. AM ANTENNA SOCKET
24. GROUND TERMINAL
25. INPUT TERMINALS [PHONO]
26. INPUT TERMINALS [AUX]
27. TAPE MONITOR TERMINALS
28. SPEAKER TERMINALS [MAIN]
29. SPEAKER TERMINALS [REMOTE]
30. VOLTAGE SELECTOR SWITCH
31. AC OUTLET

## ■ ANORDNUNG DER EINSTELLKNÖPFE

1. LAUTSPRECHERSCHALTER
2. FELDSTÄRKENANZEIGE
3. FEINABSTIMMUNG
4. ABSTIMMEN
5. KOPFHÖRERANSCHLUSS
6. NETZSCHALTER
7. BASSREGLER (BASS)
8. HÖHENREGLER (TREBLE)
9. TIEFENFILTER (LOW)
10. HÖHEN FILTERSCHALTER (HIGH)
11. BALANCEREGLER
12. LAUTSTÄRKEREGLER
13. LAUTSTÄRKEKORREKTUR
14. BETRIEBSARTENSCHALTER
15. MITHÖRSCHALTER FÜR TONBAND
16. AM BAND-WAHLSCHALTER
17. WAHLSCHALTER (SELECTOR)
18. AM ANTENNEN SCHRAUBKLEMME
19. UKW ANTENNEN SCHRAUBKLEMME
20. ANTENNEN WAHLSCHALTER (ANT)
21. UKW ANTENNEN BUCHSEN
22. LAUTSPRECHER SCHUTZ SICHERUNGSHALTER
23. AM ANTENNEN BUCHSEN
24. ERDE
25. EINGANGSKLEMMEN [PHONO]
26. EINGANGSKLEMMEN [AUX]
27. TAPE MONITOR BUCHSEN
28. HAUPTLAUTSPRECHER [MAIN]
29. HAUPTLAUTSPRECHER [REMOTE]
30. NETZEINSTELLUNG
31. STROMAUSFLÜSSE

## ■ LOCATION OF CIRCUIT BOARD

## ■ ANORDNUNG DER SCHALTPLATTE



## ■ TO REMOVE CHASSIS AND PANEL

1. Remove four (4) cabinet-mounting screws, nos. ①～④, as illustrated in fig. 1.
2. Remove cabinet from chassis.
3. Remove nine (9) bottom board-mounting red screws, nos. ⑤～⑬, as illustrated in fig. 1.
4. Remove bottom board from chassis.
5. To remove the front panel, nine (9) control knobs from front view should be first removed.
6. Remove seven (7) panel-mounting black screws, nos. ⑭～⑳, as illustrated in fig. 2 and 3.
7. Remove panel from chassis.
8. To reassemble, reverse the above procedure.

## ■ ABNEHMEN DER CHASSIS UND FRONTPANEEL

1. Die vier (4) Gehäuse-Befestigungsschrauben Nr. ①～④ entfernen. (Vgl. Abb. 1)
2. Gehäuse vom Chassis abnehmen.
3. Die neuner (9) rote Bodenplatte-Befestigungsschrauben Nr. ⑤～⑬ entfernen. (Vgl. Abb. 1)
4. Bodenplatte vom Chassis abnehmen.
5. Um das Paneel zu demontieren, Die neuner (9) Einstellknöpfe von der Stirnseite abnehmen.
6. Die sieben (7) schwarz Meßgerät-Befestigungsschrauben Nr. ⑭～⑳ entfernen. (Vgl. Abb. 2 und 3)
7. Frontpaneel vom Chassis abnehmen.
8. Beim Zusammenbau in umgekehrter Reihenfolge vorgehen.

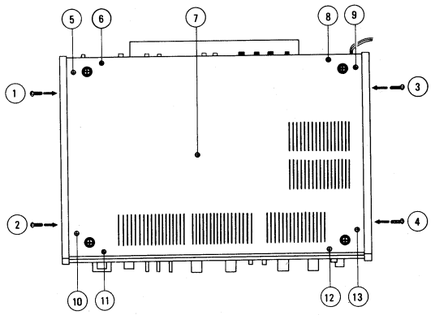



Fig. 1 **Abb. 1**

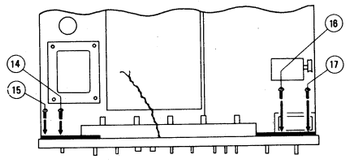



Fig. 2 **Abb. 2**

**Top View** **Draufsicht**

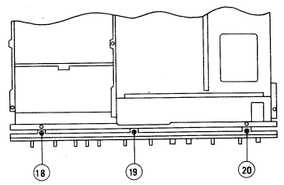



Fig. 3 **Abb. 3**

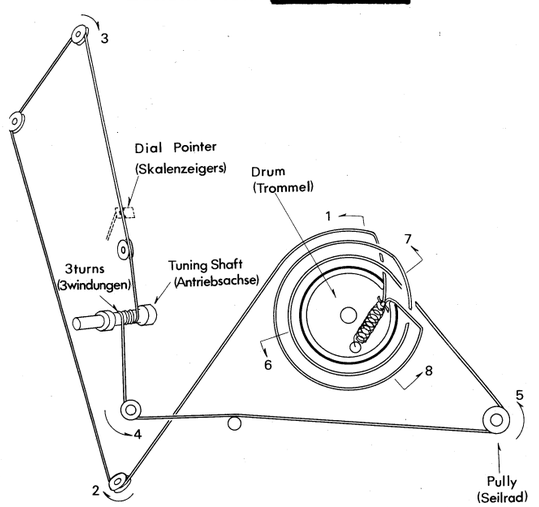
**Bottom View** **Unteranicht**

## ■ DIAL CORD INSTALLATION GUIDE

1. Dial cord length is 70 15/16″ (180cm).
2. Tuning gang is positioned at minimum capacity.

## ■ ANWEISUNG FÜR DAS AUFLEGEN DES SKALENSEILES

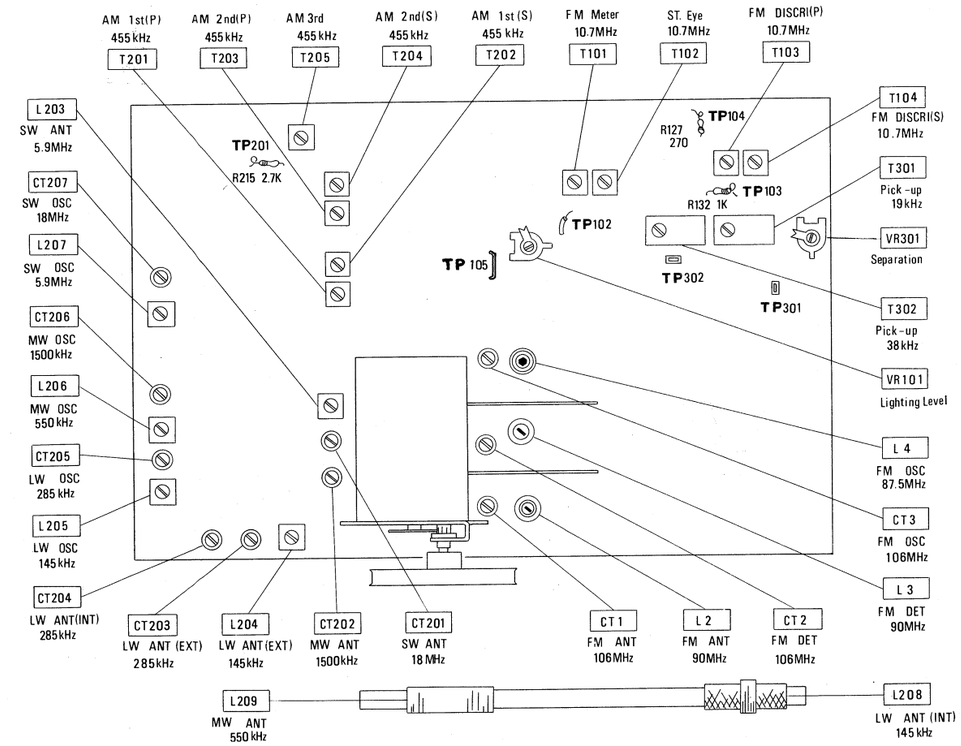
1. Skalenseil-Länge = 180cm.
2. Drehkondensator sollte für minimum Kapazität eingestellt sein.



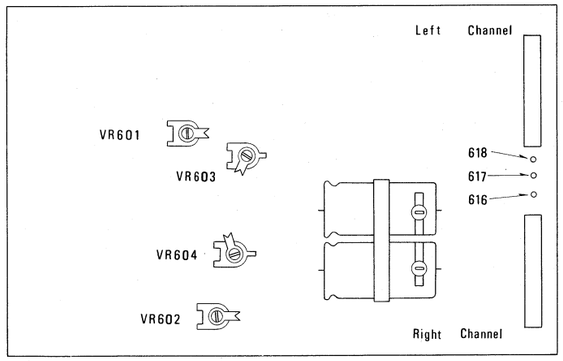


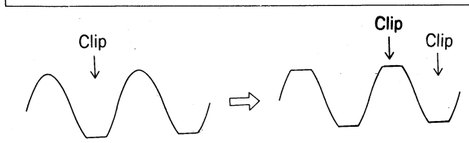

## ■ ALIGNMENT INSTRUCTIONS ■ ABGLEICHANWEISUNG

### • Alignment Points — FM/AM Circuit • Abgleichpunkte — UKW/AM Schaltung




### AF Circuit NF Schaltung




**(Output signal wave from speakers terminal)**

Fig. 1

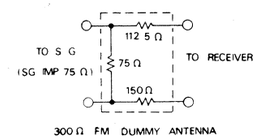



Fig. 2

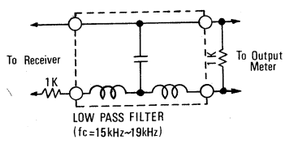
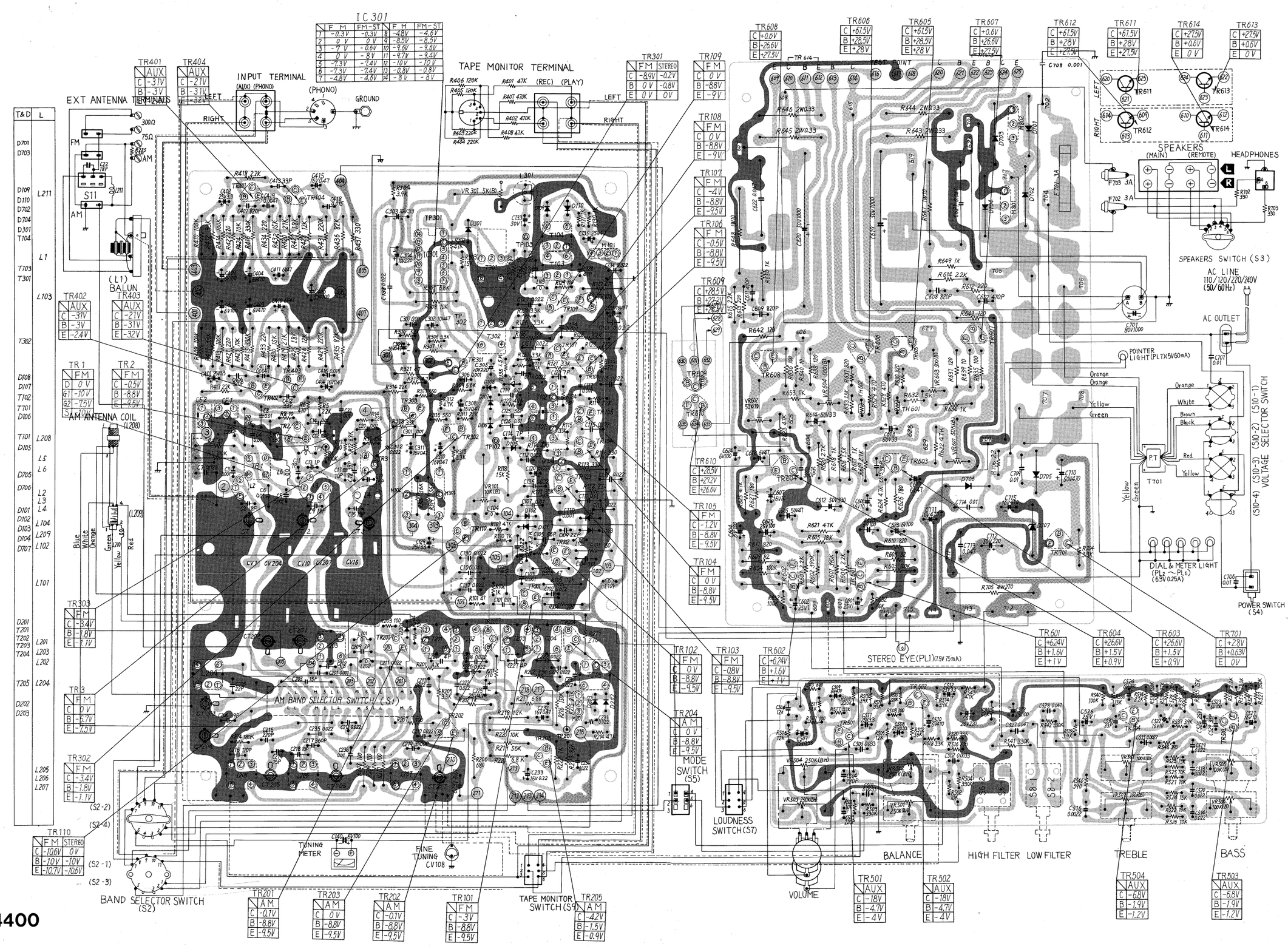



Fig. 3

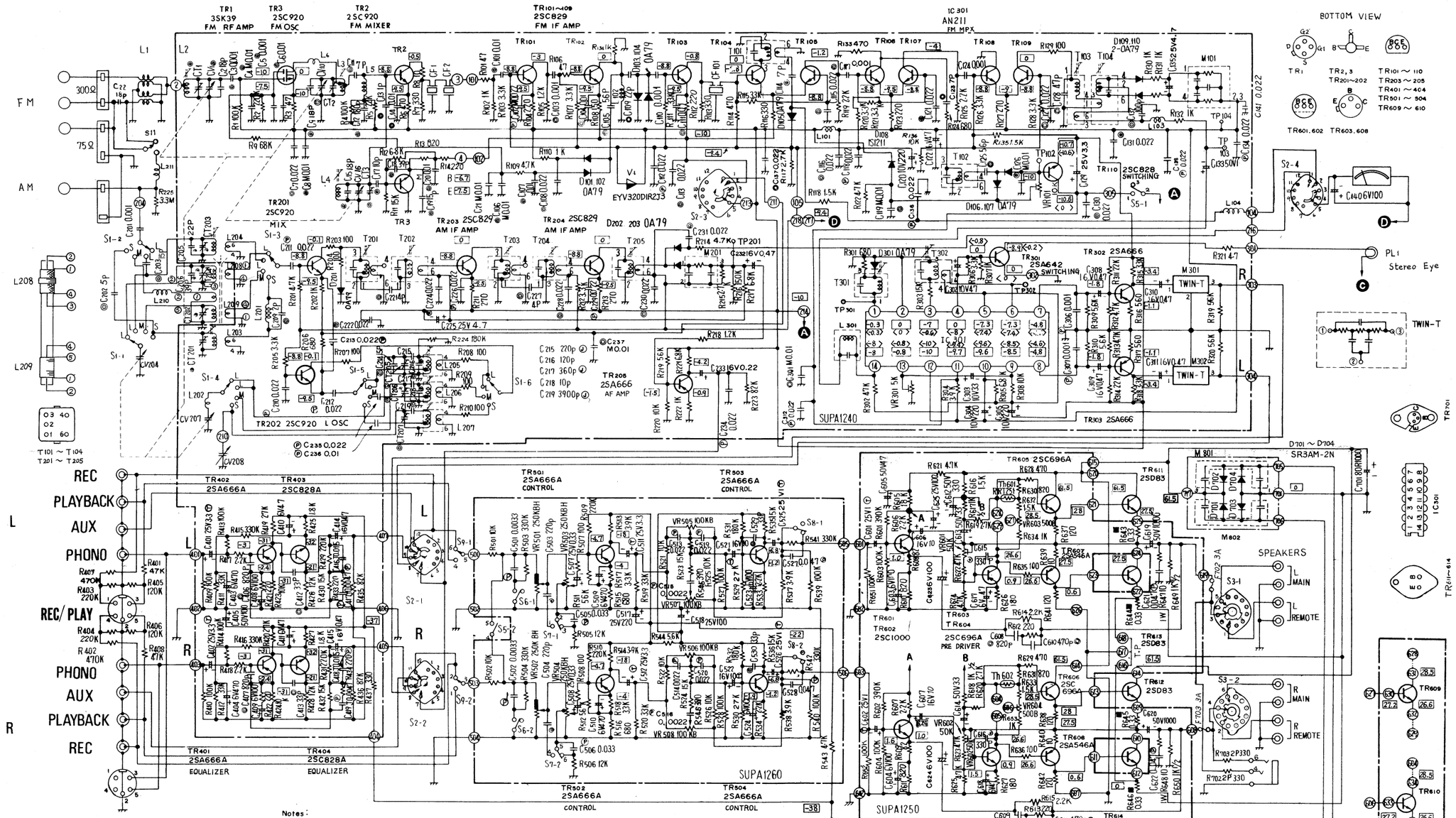
# Printed Circuit Board Wiring View Model SA-4400

Earth Line | Positive Voltage Line | ⊖ B Voltage Line


IC 301
F M FM-ST F M FM-ST
1 -0.3V -0.3V 8 -4.8V -4.6V
2 0 V 0 V 9 -8.5V -8.5V
3 -7 V -0.6V 10 -9.6V -9.6V
4 0 V -8 V 11 -9.7V -9.4V
5 -7.3V -7.4V 12 -10 V -10 V
6 -7.3V -7.4V 13 -0.8V -0.8V
7 -4.8V -4.6V 14 -8 V -8 V
TR401 AUX C -3.1V B -3V E -2.4V
TR404 AUX C -2.1V B -3.1V E -3.2V
INPUT TERMINAL (AUX) (PHONO)
(PHONO)
GROUND
TAPE MONITOR TERMINAL
TR301 F M STEREO C -8.9V -0.2V B 0 V -0.8V E 0 V 0 V
EXT ANTENNA TERMINALS
300Ω
75Ω
FM
AM
S11
LEFT
RIGHT
(REC) (PLAY)
(L1) BALUN
TR402 AUX C -3.1V B -3V E -2.4V
TR403 AUX C -2.1V B -3.1V E -3.2V
TR1 F M D 0 V G1 -10V G2 -7.5V S -10V
TR2 F M C -0.5V B -8.8V E -9.5V
AM ANTENNA COIL (L208)
TR303 F M C -3.4V B -1.8V E -1.7V
TR3 F M C 0 V B -6.7V E -7.5V
TR302 F M C -3.4V B -1.8V E -1.7V
TR110 F M STEREO C -10.6V 0 V B -10 V -10V E -10.7V -10.6V
AM BAND SELECTOR SWITCH (S1)
BAND SELECTOR SWITCH (S2)
(S2-1) (S2-2) (S2-3) (S2-4)
TUNING METER
FINE TUNING CV108
TAPE MONITOR SWITCH (S1)
TR201 AM C -0.7V B -8.8V E -9.5V
TR203 AM C 0 V B -8.8V E -9.5V
TR202 AM C -0.7V B -8.8V E -9.5V
TR101 F M C -3V B -8.8V E -9.5V
TR205 AM C -4.2V B -1.5V E -0.9V
TR608 C +0.6V B +26.6V E +27.5V
TR606 C +61.5V B +28.5V E +28V
TR605 C +61.5V B +28.5V E +28V
TR607 C +0.6V B +26.6V E +27.5V
TR612 C +61.5V B +28V E +27.5V
TR611 C +61.5V B +28V E +27.5V
TR614 C +27.5V B +0.6V E 0 V
TR613 C +27.5V B +0.6V E 0 V
TR109 F M C 0 V B -8.8V E -9V
TR108 F M C 0 V B -8.8V E -9V
TR107 F M C -4V B -8.8V E -9.5V
TR106 F M C -0.5V B -8.8V E -9.5V
TR609 C +28.5V B +27.2V E +26.6V
TR610 C +28.5V B +27.2V E +26.6V
TR105 F M C -1.2V B -8.8V E -9.5V
TR104 F M C 0 V B -8.8V E -9.5V
TR102 F M C 0 V B -8.8V E -9.5V
TR103 F M C -0.8V B -8.8V E -9.5V
TR602 C +6.24V B +1.6V E +1V
TR204 A M C 0 V B -8.8V E -9.5V
MODE SWITCH (S5)
LOUDNESS SWITCH (S7)
VOLUME
TR501 AUX C -1.8V B -4.7V E -4V
TR502 AUX C -1.8V B -4.7V E -4V
TR601 C +6.24V B +1.6V E +1V
TR604 C +26.6V B +1.5V E +0.9V
TR603 C +26.6V B +1.5V E +0.9V
TR701 C +28V B +0.63V E 0V
STEREO EYE (PL1) (T5V 75mA)
BALANCE
HIGH FILTER LOW FILTER
TREBLE
BASS
TR504 AUX C -6.8V B -1.9V E -1.2V
TR503 AUX C -6.8V B -1.9V E -1.2V
SPEAKERS (MAIN) (REMOTE)
HEADPHONES
SPEAKERS SWITCH (S3)
AC LINE 110/120/220/240V (50/60Hz)
AC OUTLET
POINTER LIGHT (PLT) (5V 60mA)
DIAL & METER LIGHT (PL2 ~ PL6) (6.3V 0.25A)
POWER SWITCH (S4)
VOLTAGE SELECTOR SWITCH (S10-1) (S10-2) (S10-3) (S10-4)

# Schematic Diagram Model SA-4400

(This schematic diagram may be modified with development of technology.)




**Notes :**

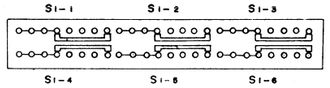
1. S1-1~S1-6 AM band selector switch in "**LW (INT ANT)**" position. LW (INT ANT) ↔ LW ↔ MW ↔ SW
2. S2-1~S2-4 Selector switch in "**PHONO**" position.. AM ↔ FM AUTO ↔ PHONO ↔ AUX
3. S3-1, S3-2 Speakers switch in "**OFF**" position. OFF ↔ MAIN ↔ REMOTE ↔ MAIN + REMOTE
4. S4 Power source switch in "**OFF**" position.
5. S5-1, S5-2 Mode switch in "**STEREO**" position.
6. S6-1, S6-2 High filter switch in "**OFF**" position.
7. S7-1, S7-2 Loudness switch in "**OFF**" position.
8. S8-1, S8-2 Low filter switch in "**OFF**" position.
9. S9-1, S9-2 Tape monitor switch in "**SOURCE**" position.
10. S10-1~S10-4 Voltage selector switch in "**110V**" position. 110V ↔ 120V ↔ 220V ↔ 240V
11. S11 Antenna selector switch in "⌐¬|⌐¬" position.
12. DC voltage measurements are taken with tester from chassis ground.
    [ ]..... No signal condition at AM/FM/AUX position.
    ( )..... FM stereo signal reception.

**Anmerkungen :**

1. S1-1~S1-6 AM Bereichschalter auf "**LW (INT ANT)**". LW (INT ANT) ↔ LW ↔ MW ↔ SW
2. S2-1~S2-4 Wahlschalter auf "**PHONO**". AM ↔ FM AUTO ↔ PHONO ↔ AUX
3. S3-1, S3-2 Lautsprecherschalter auf "**OFF**". OFF ↔ MAIN ↔ REMOTE ↔ MAIN + REMOTE
4. S4 Netzschalter auf "**OFF**".
5. S5-1, S5-2 Betriebsartenschalter auf "**STEREO**".
6. S6-1, S6-2 Höhen Filterschalter auf "**OFF**".
7. S7-1, S7-2 Lautstärkekorrektur auf "**OFF**".
8. S8-1, S8-2 Tiefenfilterschalter auf "**OFF**".
9. S9-1, S9-2 Mithörschalter auf "**SOURCE**".
10. S10-1~S10-4 Netzwähler auf "**110V**". 110V ↔ 120V ↔ 220V ↔ 240V
11. S11 Antennen Wahlschalter auf "⌐¬|⌐¬".
12. Gleichspannungsmessungen erfolgen mit Leitungsprüfer in bezug auf Chassispotential.
    [ ]..... Spannungen nur in Stellung AM/FM/AUX.
    ( )..... Einstellung FM Stereo.

**Notes :**

1. VR101 STEREO EYE Control
2. VR301 Separation Control
3. VR503.504 Volume Control
4. VR507.508 Treble Control
5. VR505.506 Bass Control
6. VR501.502 Baldnce Control
7. VR601.602 DC unbdlance adjustment.
8. VR603.604 Icq adjustment
9. All the resistors other wise moticed are 1/4 watt ±10%, carbom film resistors.
10. Ⓒ is ceramic capacitors.
11. ■ is metal film resistor.
12. ☑ is resim coated wound resistor.
13. Ⓟ is polyester capacitor.
14. Ⓣ is Tantalum electrolytic capacitor.
15. This schematic diagram may be modified With development of technology.



# ALIGNMENT INSTRUCTIONS..... READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

## MAIN AMP ALIGNMENT

**Notes :**
1. Volume Control..... { Variable (Output Clip) / Minimum (ICQ) }
2. Maintain line voltage at rated voltage.
3. Selector Switch..... AUX
4. Speakers switch ..... MAIN +REMOTE
5. The adjustment of ICQ should be started 6 minutes after setting the power switch to the ON position.
6. Before adjusting, set volume controls (VR601, 602, 603, and 604) as shown in Alignment Point Location.

| | ALIGNMENT | INPUT SIGNAL | INDICATOR (SCOPE or VTVM) | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|
| 1 | ICQ | | Connect positive side of VTVM to No. **618** terminal (Left Side) and No. **616** terminal (Right Side), Common to No. **617** terminal. | VR603 (Left)<br>VR604 (Right) | Make adjustment so that the indication on VTVM becomes 8 mV. |
| 2 | Output Clip | 1 kHz 300 mV<br>for AUX Terminal | Scope across speaker terminals. | VR601 (Left)<br>VR602 (Right) | Adjust for symmetrical curve.<br>Refer to fig. 1. |

## AM ALIGNMENT

**Notes :**
1. Selector switch..... AM
2. AM selector switch ..... LW (INT), LW, MW, SW
3. Volume control..... { Minimum (AM-IF) / Maximum (AM-RF) }
4. Fine tuning..... Center
5. Speakers switch..... Main or Remote
6. Balance volume control..... Center
7. Maintain line voltage at rated voltage.

| | BAND | SIGNAL GENERATOR or SWEEP GENERATOR CONNECTION | SIGNAL GENERATOR or SWEEP GENERATOR FREQUENCY | RCVR. DIAL SETTING [DISTANCE] | INDICATOR (VTVM or SCOPE) | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|---|---|
| 3 | IF | High side through 0.001 μF to antenna terminal, Common to chassis. | 455 kHz | Point of noninterference | Connect vert. amp. of scope to **TP201**. | T201 (1st IFT) (P)<br>T202 (1st IFT) (S)<br>T203 (2nd IFT) (P)<br>T204 (2nd IFT) (S)<br>T205 (3rd IFT) | Adjust for maximum output. |
| 4 | LW (INT) | Fashion loop of several turns of wire and radiate signal into loop of receiver. | 145 kHz (30% Mod. with 400 Hz) | 145 kHz [17.3 mm (3/4")] | Connect meter to speaker terminals. (Left or Right side) | L205 (OSC Coil)<br>L208 (ANT Coil)• | Adjust for maximum output. Adjust L208 by moving coil bobbin along ferrite core. |
| | | | 285 kHz ( 〃 ) | 285 kHz [144.4mm (5 11/16")] | | CT205 (OSC Trimmer)<br>CT204 (ANT Trimmer) | |
| 5 | LW | High side through 0.001 μF to antenna terminal. | 145 kHz ( 〃 ) | 145 kHz | 〃 | L204 (ANT Coil) | Adjust for maximum output. |
| | | | 285 kHz ( 〃 ) | 285 kHz | | CT203 (ANT Trimmer) | |
| 6 | MW | Fashion loop of several turns of wire and radiate signal into loop of receiver | 550 kHz ( 〃 ) | 550 kHz [17.3mm (3/4")] | 〃 | L206 (OSC Coil)<br>L209 (ANT Coil)• | Adjust for maximum output. Adjust L209 by moving coil bobbin along ferrite core. |
| | | | 1500 kHz ( 〃 ) | 1500 kHz [144.4mm (5 11/16") ] | | CT206 (OSC Trimmer)<br>CT202 (ANT Trimmer) | |
| 7 | SW | 〃 | 5.9 MHz ( 〃 ) | 5.9 MHz [6mm (1/4")] | 〃 | L207 (OSC Coil)<br>L203 (ANT Coil) | Adjust for maximum output. |
| | | | 18 MHz ( 〃 ) | 18 MHz [153.5mm (6 1/32")] | | CT207 (OSC Trimmer)<br>CT201 (ANT Trimmer) | |

• Cement antenna bobbin with wax after completing alignment.

## FM ALIGNMENT

**Notes :**
1. Selector switch..... FM AUTO
2. Tape monitor switch ..... SOURCE
3. Volume control ..... Variable
4. Mode switch ..... STEREO
5. Antenna selector switch ..... FM & AM Antenna side
6. Speakers switch ..... Main or Remote
7. Balance volume control ..... Center
8. Maintain line voltage at rated voltage.

| | SIGNAL GENERATOR CONNECTION | SIGNAL GENERATOR FREQUENCY | RCVR. DIAL SETTING [DISTANCE] | INDICATOR (VTVM or SCOPE) | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|---|
| | **FM-IF ALIGNMENT** | | | | | |
| 8 | | | Point of non-interference | Connect VTVM or scope to speaker terminals. | T103 (FM DISCRI) (P) | Adjust for maximum noise output. |
| | | | | Connect positive side of DC VTVM to **TP103**, and negative side to **TP104**. | T104 (FM DISCRI) (S) | Make sure that VTVM become 0 V. |



| | SIGNAL GENERATOR CONNECTION | SIGNAL GENERATOR FREQUENCY | RCVR. DIAL SETTING [DISTANCE] | INDICATOR (VTVM or SCOPE) | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|---|
| | **FM-RF ALIGNMENT** | | | | | |
| 9 | Connect to FM antenna terminal through FM dummy antenna. Refer to fig. 2. | 87.5 MHz (100% Mod. with 400 Hz) | 87.5 MHz [0mm (0")] | Connect meter to speaker terminals. | L4 (OSC Coil) • | Adjust for maximum output. |
| 10 | 〃 | 90 MHz ( 〃 ) | 90 MHz | 〃 | L3 (DET Coil)<br>L2 (ANT Coil) | 〃 |
| 11 | 〃 | 106 MHz ( 〃 ) | 106 MHz [134.5mm (5 9/32")] | 〃 | CT3 (OSC Trimmer)<br>CT2 (DET Trimmer)<br>CT1 (ANT Trimmer) | 〃<br>Repeat steps (9) ~ (11). |

• Use six cornered screw driver for alignning FM OSC coil. (L4)

## FM MONO DISTORTION ALIGNMENT

**Note :** Connect distortion meter to speakers terminal.

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | Connect to FM antenna terminal through FM dummy antenna. | 98 MHz (100% Mod. with 400 Hz) output 60 dB | 98 MHz | Connect DC VTVM between **TP103** and **TP104**. | Tuning dial of set. | Make sure that VTVM become 0V.<br>Keep this position |
| 13 | 〃 | 〃 | 98 MHz | Distortion meter across speaker terminal. | T103 (FM DISCRI) (P) | Adjust for minimum distortion. |

## FM TUNING METER ALIGNMENT

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | Connect to FM antenna terminal through FM dummy antenna. | 98 MHz output 60 dB | 98 MHz | Tuning meter of receiver. | T101 (FM Meter) | Adjust for maximum position of tuning meter indication. |

## FM STEREO EYE SWITCHING IFT ALIGNMENT

| | | | | | | |
|---|---|---|---|---|---|---|
| 15 | Connect to FM antenna terminal through FM dummy antenna. | 98 MHz output 60 dB | 98 MHz | Connect positive side of DC VTVM to **TP105**, and negative side to **TP104**. | T102 (ST. Eye IFT) | Make adjustments so that the indication on VTVM become minimum voltage. |

## FM STEREO ALIGNMENT

**Notes :**
- Stereo-modulator ..... Connect stereo-modulator output to EXT. MOD. terminal of signal generator. Internal OSC – 1 kHz, Pilot signal modulation – 10%
- Signal generator ..... Frequency approximately – 98 MHz, Output level – 60 dB, Modulation mode – FM,
1. Selector switch..... FM AUTO
2. Mode switch ..... Stereo
3. Speakers switch ..... Main or Remote
4. Before adjusting, set volume controls (VR101 and VR301) as shown in Alignment Point Location.
5. Maintain line voltage at rated voltage.

| | SIGNAL GENERATOR CONNECTION | STEREO MODULATOR MODE and MOD. RATE | INDICATOR (VTVM or SCOPE) | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|
| | **19 kHz, 38 kHz COIL and PHASE ALIGNMENT** | | | | |
| 16 | FM antenna terminal through dummy antenna. | Pilot signal to ON | Connect scope to **TP301**, Common to chassis. | T301 (19 kHz Coil) | Adjust for maximum output. |
| 17 | 〃 | 〃 | Connect scope to **TP302**, Common to chassis. | T302 (38 kHz Coil) | 〃 |
| 18 | 〃 | 〃<br>L (or R) 30% Mod. | Connect indicator to speaker terminal. | T301 (19 kHz Coil) | Adjust for minimum right (or left) side output. |
| | **STEREO SEPARATION ALIGNMENT** | | | | |
| 19 | FM antenna terminal through dummy antenna. | Pilot signal to ON<br>L (and R) 30% Mod. | Output meter across speaker terminal through low pass filter. Refer to fig. 3. | VR301 (Separation) | Adjust for minimum right (and left) output. |
| | **STEREO EYE LIGHTING LEVEL ALIGNMENT** | | | | |
| 20 | FM antenna terminal through dummy antenna.<br>Output level.....22 dB | Pilot signal to ON.<br>L +R 100% Mod. | Stereo eye of receiver. | VR101 (Lighting Level) | Adjust volume (VR101) lighting stereo eye. |

## ■ FM-RF ALIGNMENT INSTRUCTIONS ..... Set for Germany

**ABGLEICHANWEISUNGEN.....VOR DEM ABGLEICH SORGFÄLTIG DURCHLESEN**

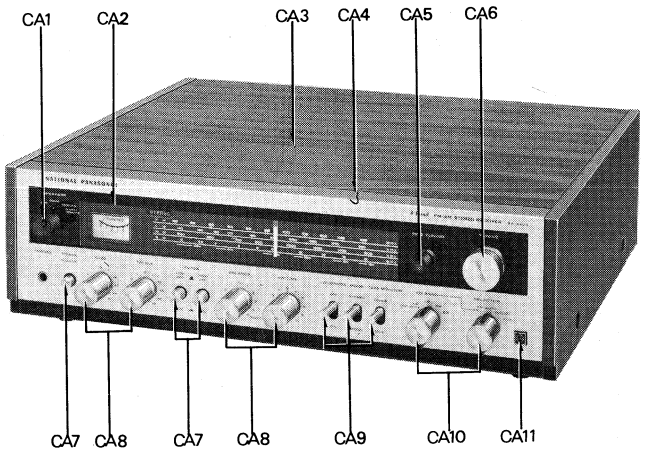
**Anmerkungen :**

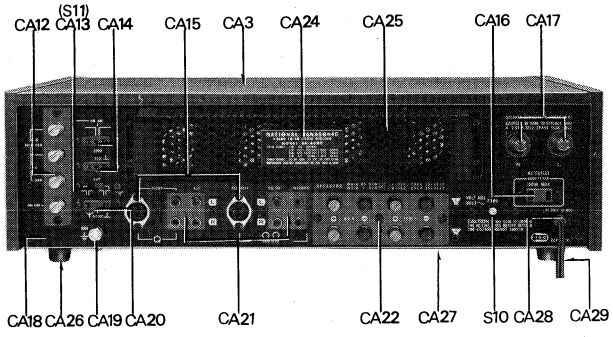
1. Wahlschalter ..... FM-AUTO
2. Lautstäkenregler ..... Variabel
3. Betriebsartenschalter ..... Stereo
4. Lautsprecherschalter ..... Main oder Remote
5. Antennenwahlschalter ..... FM und AM Antennen.
6. Netzspannung auf Nennspannung halten.
7. Der Meßsenderausgang darf nicht höher sein als notwendig, um eine bequeme Ausgangsanzeige zu erhalten.

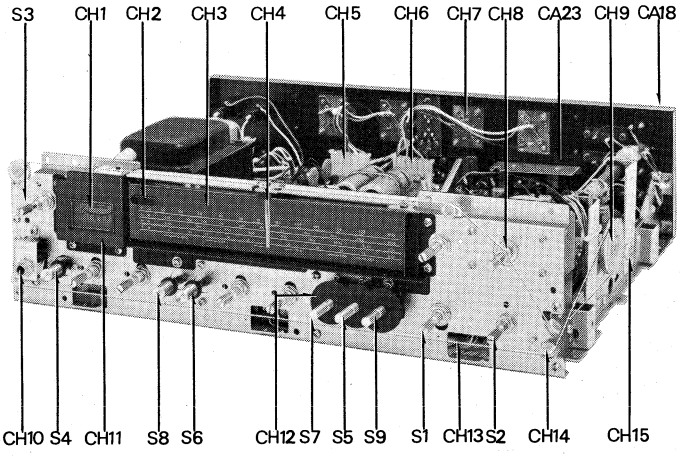
| MESSENDER | | SKALENZEIGER-EINSTELLUNG DES EMPFÄNGERS (ABSTAND) | ANGEIGE (RÖHRENVOLTMETER ODER OSZILLOGRAPH) | ABGLEICH | BEMERKUNGEN |
|---|---|---|---|---|---|
| SCHALTUNG | FREQUENZ | | | | |
| **FM HF-ABGLEICH** | | | | | |
| Anschluß an den FM Antennenanschluß über die künstliche, FM Antenne. (Vgl. Abb. 2) | 87.5 MHz (100% Mod. bei 400Hz) | 87.5 MHz (0mm) | Output meter über Lautsprecher-schwingspule anschließen. | $L_4$ (Oszillatorspule) | Auf max. Ausgang abgleichen. |
| 〃 | 90 MHz ( 〃 ) | 90 MHz | 〃 | $L_3$ (Zwischenkreis)<br>$L_2$ (Antennenspule) | 〃 |
| 〃 | 106 MHz ( 〃 ) | 106 MHz (134.5mm) | 〃 | $CT_3$ (OSZ. Trimmer)<br>$CT_2$ (DET. Trimmer)<br>$CT_1$ (ANT. Trimmer) | 〃 |

## ■ CABINET PARTS LOCATION

## ■ ANORDNUNG DER TEILE AM GEHÄUSE

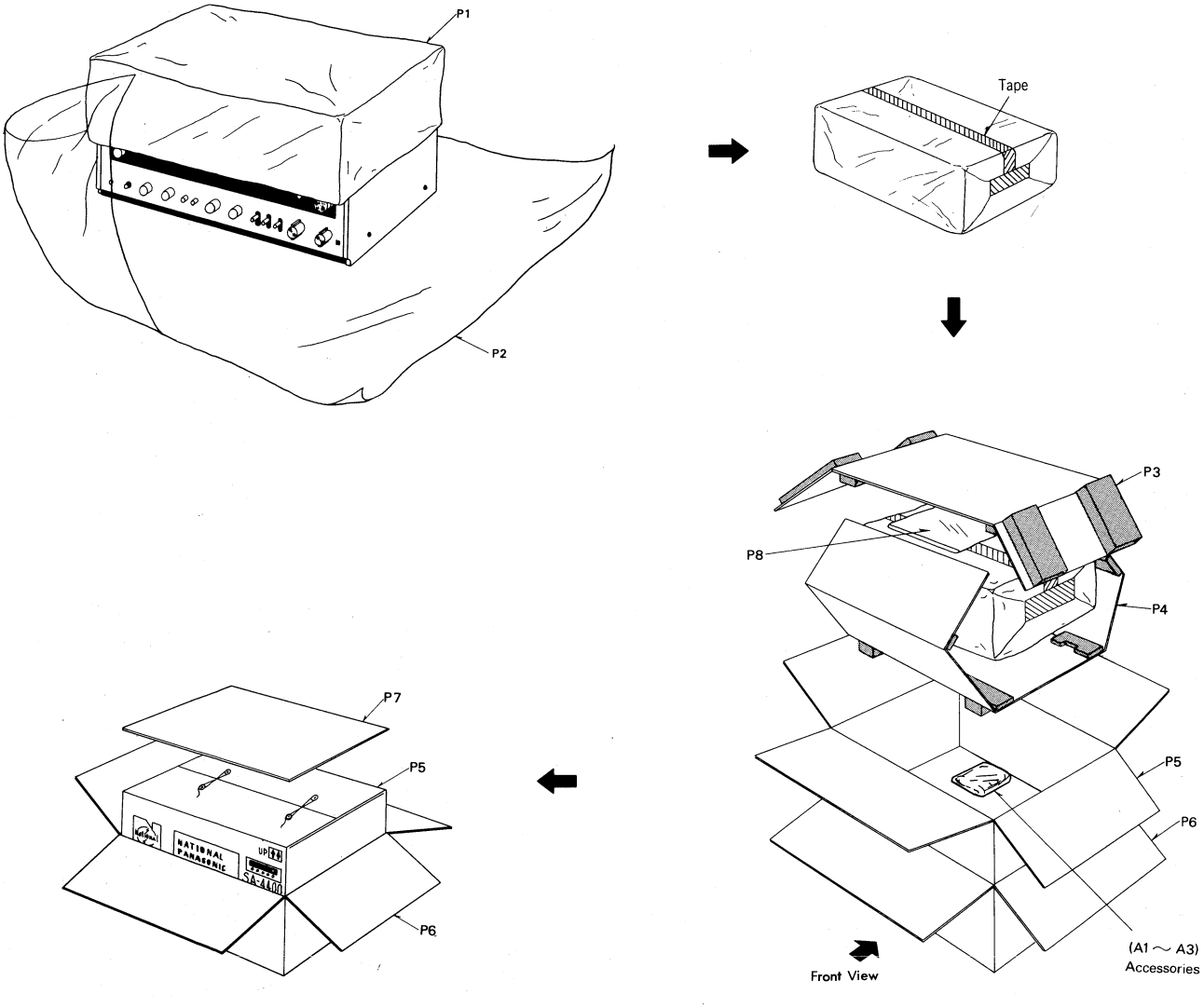


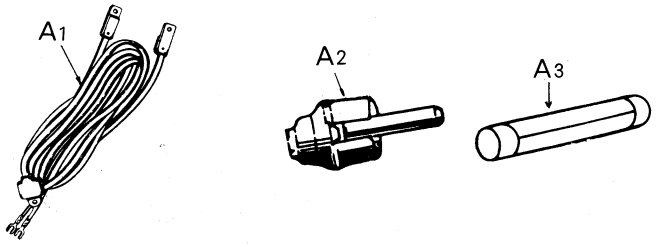
## ■ PACKING PARTS LOCATION

## ■ PACKANORDNUNG




## ■ ACCESSORIES

## ■ ZUBEHOR



# ■ REPLACEMENT PARTS LIST

**NOTES:**

1. Part numbers are indicated on most mechanical parts. Please use this part number, for parts orders.
2. Ⓝ indicates the New Parts.
3. **A~C** rank **A** rank parts will cover 80% of repair needs. **A+B** rank parts will cover 95% of repair needs. **C** rank parts are less necessary.

**Bemerkungen:**

1. Die meisten mechanischen Teile sind mit Teilnummern versehen. Bitte geben Sie diese Nummern an, sofern die Teile keine Bezugsnummern haben.
2. Ⓝ bedeutet: Neue Teile.
3. Gruppen **A~C:** Teile der Gruppe **A** machen 80% des Erstzteilbedarfes aus. Teile der Gruppen **A** und **B** machen 95% des Ersatzteilbedarfes aus. Teile der Gruppe **C** werden seltener benotigt.

**SA-4400**

| Ref. No. / Bezugs Nr. | Part No. / Teil Nr. | Description / Bezeichnung | Per Set (Pcs.) / Stückzahl pro Gerät | Remarks / Bemerkungen |
|---|---|---|---|---|
| **IC and TRANSISTORS** INTEGRIERTTE SCHALTUNG und TRANSISTOREN | | | | |
| IC301 | AN211B | FM MPX Circuit | 1 | A |
| TR1 | 3SK39Q | FM RF Amplifier | 1 | A |
| TR2,3,201,202 | 2SC920Q | FM OSC, MIX, & AM OSC MIX | 4 | A |
| TR101,102,103,104,105 106,107,108,109,203,204, | 2SC829C | FM IF & AM IF Amplifier | 11 | A |
| TR110,609,610 | 2SC828Q,R | Stereo-Mono Switching, Thermic Compensator | 3 | A |
| TR403,404 | 2SC828A Ⓕ-Q,R | Equalizer Amplifier | 2 | A |
| TR205,302,303 | 2SA666Q,R | AF Amplifier | 3 | A |
| TR401,402,501,502,503,504 | 2SA666A-P,Q | Equalizer & Control Amplifier | 6 | A |
| TR301 | 2SA642W,S | Stereo Eye Switching | 1 | A |
| TR601,602 | 2SC1000BL,GR | AF Amplifier | 2 | Ⓝ A |
| TR607,608 | 2SA546A-A,B,D,E,H | Driver Amplifier ] Use with | 2 | A |
| TR603,604,605,606 | 2SC696A-A,B,D,E,H | Pre Driver & Driver Amp. ] pair | 4 | A |
| TR611,612,613,614 | 2SD83R,O | Power Amplifier | 4 | Ⓝ A |
| TR701 | 2SD205K,L | Ripple Filter | 1 | A |
| **DIODES** DIODEN | | | | |
| D101,102,103,104,105,106,107,201,202,203,301 | OA79 | FM Lim., AGC, Meter DET & Muting DET AM AGC, DET, Meter DET Thermo Compensator. | 11 | A |
| D109,110 | 2-OA79 | FM Discriminator. | 1 pair | A |
| D108, | IS1211 | AOC | 1 | A |
| D705,706 | RVDSD-1Y | Rectifier | 2 | A |
| D701,702,703,704 | RVDSR3AM-2N | Rectifier | 4 | A |
| D707 | RVD1N4740 | Voltage Stabilizer | 1 | A |
| **COILS and TRANSFORMERS** SPULEN und TRANSFORMATOREN | | | | |
| L1 | SLAA4W1 | Balun Coil | 1 | A |
| L2 | SLAA4N7 | FM Antenna Coil | 1 | Ⓝ A |
| L3 | SLDA4P1 | FM Detector Coil | 1 | Ⓝ A |
| L4 | SLOA4N9 | FM OSC Coil | 1 | Ⓝ A |
| L5 | RLQY15G5 | FM IF Trap Coil | 1 | B |
| L6 | RLQY15S-5 | Peaking Coil | 1 | B |
| L101,102,103,104,210 | SLQX151-1Y | RFC | 5 | B |
| L201 | RLQY25S5 | RFC | 1 | B |
| L202 | RLQY50S5 | RFC | 1 | B |
| L203 | SLAA3C1 | SW Antenna Coil | 1 | Ⓝ A |
| L204 | SLAA1C1 | LW Antenna Coil | 1 | Ⓝ A |
| L205 | LOA1C1 | LW OSC Coil | 1 | Ⓝ A |
| L206 | SLOA2C4 | MW OSC Coil | 1 | Ⓝ A |
| L207 | SLOA3C2 | SW OSC Coil | 1 | Ⓝ A |
| L208,209 | SLFA6F1 | MW & LW Ferrite Core Antenna | 1 | Ⓝ A |
| L211 | RLQX20G-1 | RFC | 1 | B |
| L301 | SLMA1X2K | SCA Trap Coil | 1 | Ⓝ A |
| T101,102 | SLIA4C24 | FM Meter & Stereo Eye Switching IFT | 2 | A |
| T103 | SLIA4C54 | FM Discriminator IFT (1st) | 1 | A |
| T104 | SLIA4C56 | FM Discriminator IFT (2nd) | 1 | A |
| T201,202 | RLI2C157-M | AM 1st IFT, (P) & (S) | 2 | A |
| T203,204 | RLI2C257-M | AM 2nd IFT, (P) & (S) | 2 | A |
| T205 | RLI2C450-M | AM 3rd IFT | 1 | A |
| T301 | SLMA1D1K | 19kHz Coil | 1 | Ⓝ A |
| T302 | SLMA1D2K | 38kHz Coil | 1 | Ⓝ A |
| T701 | SLTA5R20S-W | Power Transformer | 1 | Ⓝ A |
| **THERMISTORS and VARIATITE** THERMISTOR und VARIATITE | | | | |
| TH601,602 | RRT251 | Thermistor, Main Amp. | 2 | A |
| V1 | EYV320D1R2J3 | Variatite, AOC Circuit | 1 | A |
| **CERAMIC FILTERS** KERAMISCH FILTER | | | | |
| CF1,2,101 | RVFCF10M12CG,B,R,W,Y | FM IF Circuit, 10.7MHz | 3 | A |
| **RESISTORS** WIDERSTANDE | | | | |
| R321 | ERD14TJ4R7 | 4.7Ω, 1/4W, ± 5%, Carbon | 1 | B |
| R3,106 | ERD14TJ470 | 47Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R608,609 | ERD14TJ820 | 82Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R207,208,209,210 | ERD14TJ101 | 100Ω, 1/4W, ± 5%, Carbon | 4 | B |
| R108 | ERD14TJ151 | 150Ω, 1/4W, ± 5%, Carbon | 1 | B |
| R626,627 | ERD14TJ181 | 180Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R104,112,123,421,422,433,434,612,613 | ERD14TJ221 | 220Ω, 1/4W, ± 5% Carbon | 9 | B |
| R127,211,213 | ERD14TJ271 | 270Ω, 1/4W, ± 5%, Carbon | 3 | B |
| R113,437 | ERD14TJ331 | 330Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R206,301 | ERD14TJ681 | 680Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R610,611 | ERD14TJ821 | 820Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R132,202,222,307,634,653 | ERD14TJ102 | 1kΩ, 1/4W, ± 5%, Carbon | 6 | B |
| R105,218 | ERD14TJ122 | 1.2kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R118 | ERD14TJ152 | 1.5kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R425,427 | ERD14TJ182 | 1.8kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R125,417,418,606,607,614,615 | ERD14TJ222 | 2.2kΩ, 1/4W, ± 5%, Carbon | 7 | B |
| R215,619,620 | ERD14TJ272 | 2.7kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R103,111,126,205,212,704 | ERD14TJ332 | 3.3kΩ, 1/4W, ± 5%, Carbon | 6 | B |
| R201,624,625 | ERD14TJ472 | 4.7kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R217,221,305 | ERD14TJ682 | 6.8kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R136,220,308,423,424 | ERD14TJ103 | 10kΩ, 1/4W, ± 5%, Carbon | 5 | B |
| R426,428 | ERD14TJ123 | 12kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R430,432 | ERD14TJ153 | 15kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R605 | ERD14TJ183 | 18kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R419,420 | ERD14TJ273 | 27kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R411,412 | ERD14TJ333 | 33kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R302,401,408,622,623 | ERD14TJ473 | 47kΩ, 1/4W, ± 5%, Carbon | 5 | B |
| R219,319,320 | ERD14TJ563 | 56kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R9 | ERD14TJ683 | 68kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R223,435,436 | ERD14TJ823 | 82kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R1,409,410,413,414,603,604 | ERD14TJ104 | 100kΩ, 1/4W, ± 5%, Carbon | 7 | B |
| R405,406 | ERD14TJ124 | 120kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R216 | ERD14TJ154 | 150kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R403,404 | ERD14TJ224 | 220kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R415,416,541 | ERD14TJ334 | 330kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R601,602 | ERD14TJ394 | 390kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R402,407 | ERD14TJ474 | 470kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R8 | ERD14VJ100 | 10Ω, 1/4W, ± 5%, Carbon | 1 | B |
| R706 | ERD14VJ220 | 22Ω, 1/4W, ± 5%, Carbon | 1 | B |
| R101 | ERD14VJ470 | 47Ω, 1/4W, ± 5%, Carbon | 1 | B |
| R129,203,204,507,508 | ERD14VJ101 | 100Ω, 1/4W, ± 5%, Carbon | 5 | B |
| R14 | ERD14VJ221 | 220Ω, 1/4W, ± 5%, Carbon | 1 | B |

**SA-4400**

| Ref. No. / Bezugs Nr. | Part No. / Teil Nr. | Description / Bezeichnung | Per Set (Pcs.) / Stückzahl pro Gerät | Remarks / Bemerkungen |
|---|---|---|---|---|
| R7,116 | ERD14VJ331 | 330Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R545,546 | ERD14VJ391 | 390Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R6,114,133 | ERD14VJ471 | 470Ω, 1/4W, ± 5%, Carbon | 3 | B |
| R316,317 | ERD14VJ561 | 560Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R124,515,516 | ERD14VJ681 | 680Ω, 1/4W, ± 5%, Carbon | 3 | B |
| R13,630,631 | ERD14VJ821 | 820Ω, 1/4W, ± 5%, Carbon | 3 | B |
| R102,110,130, 131,134 | ERD14VJ102 | 1kΩ, 1/4W, ± 5%, Carbon | 5 | B |
| R135,303,632, 633 | ERD14VJ152 | 1.5kΩ, 1/4W, ± 5%, Carbon | 4 | B |
| R119,533,534 | ERD14VJ222 | 2.2kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R117 | ERD14VJ272 | 2.7kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R107,115,120, 121,128,306, 315,318,517, 518 | ERD14VJ332 | 3.3kΩ, 1/4W, ± 5%, Carbon | 10 | B |
| R304,513,514, 537,538 | ERD14VJ392 | 3.9kΩ, 1/4W, ± 5%, Carbon | 5 | B |
| R109,122,214, 312,313,543 | ERD14VJ472 | 4.7kΩ, 1/4W, ± 5%, Carbon | 6 | B |
| R309,310,544 | ERD14VJ562 | 5.6kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R12 | ERD14VJ682 | 6.8kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R501,502,521, 522,525,526 | ERD14VJ103 | 10kΩ, 1/4W, ± 5%, Carbon | 6 | B |
| R505,506 | ERD14VJ123 | 12kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R11,523,524, 535,536 | ERD14VJ153 | 15kΩ, 1/4W, ± 5%, Carbon | 5 | B |
| R5,311,314 | ERD14VJ223 | 22kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R529,530 | ERD14VJ273 | 27kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R519,520 | ERD14VJ333 | 33kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R511,512 | ERD14VJ563 | 56kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R4,527,528, 539,540,651, 652 | ERD14VJ104 | 100kΩ, 1/4W, ± 5%, Carbon | 7 | B |
| R224 | ERD14VJ184 | 180kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R2 | ERD14VJ224 | 220kΩ, 1/4W, ± 5%, Carbon | 1 | B |
| R503,504,542 | ERD14VJ334 | 330kΩ, 1/4W, ± 5%, Carbon | 3 | B |
| R639,640 | ERD14FJ100 | 10Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R635,636 | ERD14FJ101 | 100Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R637,638,641, 642 | ERD14FJ121 | 120Ω, 1/4W, ± 5%, Carbon | 4 | B |
| R628,629 | ERD14FJ471 | 470Ω, 1/4W, ± 5%, Carbon | 2 | B |
| R621 | ERD14FJ472 | 4.7kΩ, 1/4W, ± 5%, Carbon | 1 | Ⓝ B |
| R531,532 | ERD14TSJ184 | 180kΩ, 1/4W, ± 5%, Carbon | 2 | B |
| R429,431,509, 510 | ERD14TSJ224 | 220kΩ, 1/4W, ± 5%, Carbon | 4 | B |
| R617,618,649, 650 | ERD12TJ102 | 1kΩ, 1/2W, ± 5%, Carbon | 4 | B |
| R616 | ERD12FJ152 | 1.5kΩ, 1/2W, ± 5%, Carbon | 1 | B |
| R647,648 | ERD1PZK100 | 10Ω, 1W, ±10%, Carbon | 2 | B |
| R225 | ERC12GK335Z | 3.3MΩ, 1/2W, ±10%, Solid | 1 | C |
| R643,644,645, 646 | ERX2ANKR33 | 0.33Ω, 2W, ±10%, Metalic | 4 | Ⓝ B |
| R705 | ERM4P271 | 270Ω, 4W, ± 5%, Wire | 1 | C |
| R702,703 | ERM2P331 | 330Ω, 2W, ± 5%, Wire | 2 | C |

**VARIABLE RESISTORS**
**EINSTELLWIDERSTÄNDE**

| | | | | |
|---|---|---|---|---|
| VR101 | EVLS3AA00B14 | Switching Level Adjustment 10kΩ (B) | 1 | A |
| VR301 | EVLS3AA00B53 | Separation Adjustment 5kΩ (B) | 1 | A |
| VR501,502 | EVFNTAL30252 | Balance Control 250kΩ (BH) | 1 | A |
| VR503,504 | EVGN9AL30BF5 | Volume Control 250kΩ (BH) | 1 | A |
| VR505,506, 507,508 | EVFNTAU30B15 | Bass, Treble Control 100kΩ (BH) | 2 | Ⓝ A |
| VR601,602 | EVLS3AA00B54 | DC Unbalance Adjustment 50kΩ (B) | 2 | A |
| VR603,604 | EVLS3AA00B52 | ICQ Adjustment 500Ω (B) | 2 | A |

**CAPACITORS**
**KONDENSATOREN**

| | | | | |
|---|---|---|---|---|
| C13 | ECCD05010CC | 1pF, 50WV, ±0.25pF, Ceramic | 1 | C |
| C209 | ECCD05020CC | 2pF, 50WV, ±0.25pF, Ceramic | 1 | C |
| C221,227 | ECCD05040CC | 4pF, 50WV, ±0.25pF, Ceramic | 2 | C |
| C202 | ECCD05050CC | 5pF, 50WV, ±0.25pF, Ceramic | 1 | C |
| C11,114,123 | ECCD05070DC | 7pF, 50WV, ±0.5pF, Ceramic | 3 | C |
| C22 | ECCD05180KC | 18pF, 50WV, ±10%, Ceramic | 1 | C |
| C15 | ECCD05180KS | 18pF, 50WV, ±10%, Ceramic | 1 | C |
| C128 | ECCD05470KU | 47pF, 50WV, ±10%, Ceramic | 1 | C |
| C12 | ECCD05181K | 180pF, 50WV, ±10%, Ceramic | 1 | C |
| C503,504 | ECCD05221K | 220pF, 50WV, ±10%, Ceramic | 2 | C |
| C17,218 | ECMS05100K-H | 10pF, 50WV, ±10%, Mica | 2 | C |
| C19,203,214 | ECMS05150K-H | 15pF, 50WV, ±10%, Mica | 3 | C |
| C2,9 | ECMS05180K-H | 18pF, 50WV, ±10%, Mica | 2 | C |
| C109,205 | ECMS05220K-H | 22pF, 50WV, ±10%, Mica | 2 | C |
| C412,413,529, 530 | ECMS05330K-H | 33pF, 50WV, ±10%, Mica | 4 | C |
| C18,206 | ECMS05390K-H | 39pF, 50WV, ±10%, Mica | 2 | C |
| C105,125 | ECMS05560K-H | 56pF, 50WV, ±10%, Mica | 2 | C |
| C132 | ECMS05101K-H | 100pF, 50WV, ±10%, Mica | 1 | C |
| C216 | ECMS05121K-H | 120pF, 50WV, ±10%, Mica | 1 | C |
| C3,5,103,110, 117,124,201 | ECKD05102P | 0.001μF, 50WV, $^{+100}_{-0}$%, Ceramic | 7 | C |
| C6,14,101,104, 107,111 | ECKE05103P | 0.01μF, 50WV, $^{+100}_{-0}$%, Ceramic | 6 | C |
| C4,8,20,21,106, 119,126,237, 301 | ECKE05103MY | 0.01μF, 50WV, ±20%, Ceramic | 9 | C |
| C7,108,113, 115,116,121, 127,130,131, 137,222,224, 228,230,141 | ECKE05223P | 0.022μF, 50WV, $^{+100}_{-0}$%, Ceramic | 15 | C |
| C713 | ECKD05473Z | 0.047μF, 50WV, $^{+80}_{-20}$ %, Ceramic | 1 | C |
| C615,616 | ECKD5331KF | 330pF, 500WV, ±10%, Ceramic | 2 | C |
| C610,611 | ECKD5471K | 470pF, 500WV, ±10%, Ceramic | 2 | C |
| C406,407,608, 609 | ECKD5821K | 820pF, 500WV, ±10%, Ceramic | 4 | C |
| C709,714 | ECKD5103P | 0.01μF, 500WV, $^{+100}_{-0}$%, Ceramic | 2 | C |
| C708 | ECNU4A102M | 0.001μF, 450WV, ±20%, Paper | 1 | C |
| C706,707 | ECNU4A103M | 0.01μF, 450WV, ±20%, Paper | 2 | C |
| C215 | ECQS1221JZ | 220pF, 125WV, ± 5%, Styrol | 1 | C |
| C217 | ECQS1361JZ | 360pF, 125WV, ± 5%, Styrol | 1 | C |
| C219 | ECQS1392KZ | 3900pF, 125WV, ±10%, Styrol | 1 | C |
| C306,307 | ECQG05102KZN | 0.001μF, 50WV, ±10%, Polyester | 2 | C |
| C515,516 | ECQG05222KZN | 0.0022μF, 50WV, ±10%, Polyester | 2 | C |
| C501,502 | ECQG05332KZN | 0.0033μF, 50WV, ±10%, Polyester | 2 | C |
| C417,419 | ECQG05472JZN | 0.0047μF, 50WV, ± 5%, Polyester | 2 | C |
| C236 | ECQG05103KZN | 0.01μF, 50WV, ±10%, Polyester | 1 | C |
| C416,418 | ECQG05153JZN | 0.015μF, 50WV, ± 5%, Polyester | 2 | C |
| C102,112,118, 134,136,138, 210,211,212, 213,226,229, 231,234,235, 312,513,514, 519,520 | ECQG05223KZN | 0.022μF, 50WV, ±10%, Polyester | 20 | C |
| C505,506 | ECQG05333KZN | 0.033μF, 50WV, ±10%, Polyester | 2 | C |
| C527,528 | ECQG05473KZN | 0.047μF, 50WV, ±10%, Polyester | 2 | C |
| C621,622 | ECQM1473M | 0.047μF, 125WV, ±20%, Polyester | 2 | C |
| C410,411,617, 618 | ECEA6V47 | 47μF, 6.3WV, Electrolytic | 4 | B |
| C140,408,409, 523,524,603, 604,623,624 | ECEA6V100 | 100μF, 6.3WV, Electrolytic | 9 | B |
| C403,404,509, 510 | ECEA6V470 | 470μF, 6.3WV, Electrolytic | 4 | B |
| C303 | ECEA10V33 | 33μF, 10WV, Electrolytic | 1 | B |
| C302 | ECEA10V47 | 47μF, 10WV, Electrolytic | 1 | B |
| C120,304,305 | ECEA10V220 | 220μF, 10WV, Electrolytic | 3 | B |
| C711 | ECEA10V470 | 470μF, 10WV, Electrolytic | 1 | B |
| C606,607 | ECEA16V10 | 10μF, 16WV, Electrolytic | 2 | B |
| C122 | ECEA16V47 | 47μF, 16WV, Electrolytic | 1 | B |
| C715 | ECEA16V470 | 470μF, 16WV, Electrolytic | 1 | B |
| C129 | ECEA25V3R3 | 3.3μF, 25WV, Electrolytic | 1 | B |
| C135,225 | ECEA25V4R7 | 4.7μF, 25WV, Electrolytic | 2 | B |
| C518,625 | ECEA25V100 | 100μF, 25WV, Electrolytic | 2 | B |
| C517 | ECEA25V220 | 220μF, 25WV, Electrolytic | 1 | B |
| C133 | ECEA50V1 | 1μF, 50WV, Electrolytic | 1 | B |
| C613,614 | ECEA50V33 | 33μF, 50WV, Electrolytic | 2 | B |
| C605 | ECEA50V47 | 47μF, 50WV, Electrolytic | 1 | B |
| C405 | ECEA50V100 | 100μF, 50WV, Electrolytic | 1 | B |
| C712 | ECEA50V220 | 220μF, 50WV, Electrolytic | 1 | B |
| C612 | ECEA50V330 | 330μF, 50WV, Electrolytic | 1 | Ⓝ B |
| C710 | ECEA50V470 | 470μF, 50WV, Electrolytic | 1 | Ⓝ B |
| C619,620 | ECEB50V1000 | 1000μF, 50WV, Electrolytic | 2 | Ⓝ B |
| C701 | ECEM80R1000E | 1000μF, 80WV, Electrolytic | 1 | Ⓝ B |
| C233 | ECAG16ER22 | 0.22μF, 16WV, Electrolytic | 1 | B |
| C232,308,309, 310,311,414, 415 | ECAG16ER47 | 0.47μF, 16WV, Electrolytic | 7 | B |
| C507,508 | ECAG25ER33 | 0.33μF, 25WV, Electrolytic | 2 | B |
| C521,522 | ECSZ16EF10 | 10μF, 16WV, Electrolytic | 2 | B |
| C601,602,525, 526 | ECSZ25EF1 | 1μF, 25WV, Electrolytic | 4 | B |
| C401,402,511, 512 | ECSZ25EF3R3 | 3.3μF, 25WV, Electrolytic | 4 | B |

| Ref. No. / Bezugs Nr. | Part No. / Teil Nr. | Description / Bezeichnung | Per Set (Pcs.) / Stückzahl pro Gerät | Remarks / Bemerkungen |
|---|---|---|---|---|
| **VARIABLE CAPACITORS** EINSTELL KONDENSATOREN | | | | |
| CV1,10,16, 204,207 | ECV5MD34X24G | FM & AM Tuning Gang | 1 | Ⓝ A |
| CV208 | ECV1YW02D68A | SW Fine Tuning Gang | 1 | A |
| CT1,2,3,207 | ECV1ZW10P32 | Ceramic Trimmer | 4 | A |
| CT201,202, 203,204, 205,206 | ECV1ZW20P32 | Ceramic Trimmer | 6 | A |
| **LIGHTS and FUSES** SKALENBELEUCHTUNG und SICHERUNG | | | | |
| PL1 | XAM37T150 | Light, Stereo Eye (7.5V 75mA) | 1 | A |
| PL2,3,4,5,6 | XAM35K | Light, Dial & Meter (6.3V 0.25A) | 5 | A |
| PL7 | XAMR18K300 | Light, Dial Pointer (5V 60mA) | 1 | A |
| F701 | XBA1E30NS5 | Fuse, Power Source [3A] | 1 | A |
| F702,703 | XBAS1A3001 | Fuse, Speakers Protection [3A] | 2 | A |
| **COMPONENT COMBINATION** KOMPONENTE KOMBINATION | | | | |
| M101 | EXA5DL04C | FM Detector Circuit | 1 | B |
| M201 | EXAF203Z471 | AM Detector Circuit | 1 | B |
| M301,302 | EXAM505F | 38kHz Trap Circuit | 2 | Ⓝ B |
| M801,802 | RXAF103P22HD | Hum Canceler, 0.01μF(X2), 500WV | 2 | B |
| **SWITCHES** SCHALTER | | | | |
| S1-1~1-6 | SSRA17 | AM Band Selector Switch | 1 | Ⓝ B |
| S2-1~2-4 | SSRA16 | Selector Switch | 1 | Ⓝ B |
| S3-1,3-2 | SSRA23 | Speakers Selector Switch | 1 | Ⓝ B |
| S4 | SSHA9S | Power Source Switch | 1 | A |
| S5-1,5-2,7-1, 7-2 | SSLA3S | Mode, Loudness Switch | 2 | A |
| S6-1,6-2,8-1, 8-2 | SSHA13S | High, Low Filter Switch | 2 | A |
| S9-1,9-2 | SSLA8S | Tape Monitor Switch | 1 | A |
| S10-1~10-4 | SSRA7S | Voltage Selector Switch | 1 | B |
| S11 (CA13) | SSSA3S | Antenna Selector Switch | 1 | Ⓝ A |
| **CABINET** GEHÄUSE | | | | |
| CA1 | SBNA73 | Knob, Speakers Selector Switch | 1 | Ⓝ A |
| CA2 | SGWA720 | Panel, Dial | 1 | Ⓝ C |
| CA3 | SKAA430 | Cabinet (Complete) | 1 | Ⓝ B |
| CA4 | SGWA710 | Panel | 1 | Ⓝ C |
| CA5 | SBNA74 | Knob, Fine Tuning | 1 | Ⓝ A |
| CA6 | SBNA72S | Knob, Tuning | 1 | Ⓝ A |
| | SNEA215S | Screw, Tuning Knob | 1 | A |
| CA7 | SBNA56 | Knob, Power Source & Filter Switch | 3 | B |
| CA8 | SBNA46-1 | Knob, Bass Treble Balance & Volume Control | 4 | A |
| CA9 | SBNA51S | Knob, Loudness Mode & Tape Monitor Switch | 3 | B |
| CA10 | SBNA49 | Knob, Selector & AM Band Selector Switch | 2 | A |
| CA11 | SGBA30 | Badge, NATIONAL | 1 | C |
| | SYPA70AS | Rear Panel (Complete) | 1 | Ⓝ B |
| CA12 | SJFA4401-1 | Terminal, FM & AM Ext. Antenna | (1) | Ⓝ C |
| CA13 (S11) | SSSA3S | Antenna Selector Switch | (1) | Ⓝ A |
| CA14 | SJSA6202 | Socket, FM Ext. Antenna | (2) | B |
| CA15 | RJS31-1 | DIN Socket, PHONO & Tape Monitor | (2) | B |
| CA16 | SJSA1 | AC Socket, AC Power Source | (1) | C |
| CA17 | SJFA107 | Holder, Speakers Protection Fuse | (2) | C |
| CA18 | SGPA140A | Rear Panel | (1) | Ⓝ C |
| CA19 | SNEA404 | Nut, Ground Terminal (Outer) | (1) | C |
| CA19 | SNEA204S | Screw, Ground Terminal | (1) | C |
| CA19 | XNG4CS | Nut, Ground Terminal (Inner) | (1) | C |
| CA20 | SJSA6201 | Socket, AM Ext. Antenna | (1) | B |
| CA21 | SJFA3407 | Terminal, Input & Tape Monitor | (2) | C |
| CA22 | SJFA4802 | Terminal, Speakers | (1) | Ⓝ C |
| CA23 | SMCA70 | Shield Plate | (1) | C |
| CA24 | SGTA1020 | Name Plate | 1 | Ⓝ C |
| CA25 | SUVA47 | Cover, Power Transistor | 1 | Ⓝ C |
| | SYUA30A | Bottom Board (Complete) | 1 | Ⓝ C |
| CA26 | SHRA202 | Leg | (4) | C |
| | XRL3X14 | Screw, Leg | (4) | C |
| | XWG3X10 | Washer, Leg | (4) | C |
| CA27 | SKUA230 | Bottom Board | (1) | Ⓝ C |
| CA28 | RHR111 | Bushing, AC Cord | 1 | C |
| CA29 | SJAA3 | AC Cord | 1 | B |
| | XSB4+16BVCS | Screw, Cabinet M'tg. | 4 | C |
| | XTV3D8CR | Screw, Bottom Board M'tg. | 9 | C |
| | XTV3D8CK | Screw, Panel M'tg. | 7 | C |

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|---|---|---|---|---|
| **CHASSIS** CHASSIS | | | | |
| CH1 | SSMA14 | Meter, Tuning | 1 | Ⓝ A |
| CH2 | SGKA104 | Indicator, Stereo Eye | 1 | Ⓝ C |
| CH3 | SKDA240 | Scale, Dial | 1 | Ⓝ B |
| CH4 | SDPA5016 | Pointer, Dial Scale | 1 | Ⓝ B |
| | SDAA3 | Bracket, Dial Pointer | 1 | Ⓝ C |
| CH5 | SJSA3 | Connector, Left Power Transistor | 1 | Ⓝ B |
| CH6 | SJSA4 | Connector, Right Power Transistor | 1 | Ⓝ B |
| | SJPA1 | 6 pin Connector | 2 | Ⓝ B |
| CH7 | SJVA1201S | Socket, Power Transistor | 4 | C |
| CH8 | SDTA9001S | Shaft, Tuning (Complete) | 1 | Ⓝ B |
| CH9 | SDDA35-1S | Drum, Tuning | 1 | Ⓝ B |
| | XXAR3H6S | Screw, Drum | 2 | B |
| | RDS4090A | Spring, Dial Cord | 1 | A |
| CH10 | SJJA8 | Jack, Headphones | 1 | B |
| CH11 | SMNA167 | Cover, Meter | 1 | Ⓝ C |
| CH12 | SHGA920-1 | Rubber, Lever Switch | 3 | C |
| CH13 | RDZ05A | Cord, Dial [70 5/16"] | 180cm | B |
| CH14 | RDR20 | Pulley, Dial Cord | 5 | C |
| CH15 | RDR23 | Pulley, Dial Cord (Outer) | 1 | C |
| | RDR21 | Pulley, Dial Cord (Inner) | 1 | C |
| | RJV1A | Holder, Dial Light | 5 | C |
| | RJF107-2 | Holder, Fuse [F701] | 2 | C |
| | SMZA6099 | Rubber, Stereo Eye Light | 1 | C |
| **ACCESSORIES** ZUBEHÖR | | | | |
| A1 | SSAA1 | Cord, FM Antenna | 1 | B |
| A2 | RJP5 | Pin Plug | 4 | B |
| A3 | XBAS1A3001 | Fuse, Speaker Protection | 4 | A |
| **PACKINGS** VERPACKUNG | | | | |
| P1 | SPPA23 | Soft Cover | 1 | Ⓝ C |
| | SPEA3 | Cover, AC Plug Only | 1 | C |
| P2 | SPHA6004 | Polyethylene Sheet | 1 | C |
| P3 | SPNA182 | Pad (Upper) | 1 | Ⓝ C |
| P4 | SPNA181 | Pad (Lower) | 1 | Ⓝ C |
| P5 | SPNA6060A | Carton Box (Inner) | 1 | Ⓝ C |
| P6 | SPGA6100A | Carton Box (Outer) | 1 | Ⓝ C |
| P7 | SPNA187 | Top Board, Carton Box | 1 | Ⓝ C |
| P8 | SQFA102 | Printed Matter | 1 | Ⓝ B |